THE INFLUENCE OF LIGHT PHASE AND PREDATORS ON THE BEHAVIOUR OF SWAMP CRAYFISH. *Memoirs of the Queensland Museum 49(2): 704. 2004:-* *Tenuibranchiurus glypticus* (Riek, 1969) is a little studied freshwater crayfish with a distribution restricted to wallum swamps along the SE coast of Queensland. Harding & Williamson (2003) found that *T. glypticus* were more likely to be caught among sedges than in the open areas of the pools they occupy. One possible reason for this association is predator avoidance. This report describes the response of *T. glypticus* to visual and chemical cues from potential predators in laboratory conditions. The experiment examined whether the presence of a predator and light phase affected the total amount of time and the number of times that *T. glypticus* spent away from the refuge provided by sedges.

Experiments were conducted in four glass fish tanks (40 × 40 × 20cm) arranged in a block so that all four tanks were in the field of view of an overhead video recorder. Opaque partitions created visual barriers between tanks. A clear, perforated plexiglass divider separated each tank into two equal sized chambers (i.e. a predator half and a crayfish half). Approximately half of one chamber in each tank was planted with sedges to provide a refuge for *T. glypticus*.

Tanks were set up in a constant temperature room (25°C) with a 12:12 photoperiod. Freshwater crayfish have a visual range up to about 560nm (Lythgoe, 1979), therefore observations in the dark phase were achieved by using a red light (about 600nm). Observations were recorded by video recorder over a 2 hour period across the light-dark denominator once the animals had had approximately 24 hours to acclimatize to laboratory conditions. Animals were left undisturbed during the 2 hour filming period. Recordings were viewed to determine the number of times experimental animals left the refuge and the duration of this activity. Because the light cycle and video operation were on separate timing devices light and dark recording periods were not always equal. Therefore all variables examined were expressed in relation to the duration of the light or dark phase.

Four experimental conditions (3 predators and a control) were applied for each of 12 replicate trials. Potential predators were spangled perch (*Leiopotherapon unicolour*), striped gudgeon (*Gobiomorphus australis*) and water scorpion (*Lethocerus insulanus*). Gudgeon and water scorpion were found in pools with *T. glypticus* (Harding & Williamson, 2003) and water scorpion consumed *T. glypticus* in the laboratory (D. Harding, pers. obs.). Spangled perch were used as an aggressive visual predator. The same predators were used in a number of trials but prey animals were used only once (48 *T. glypticus* were used). Tank water was changed after each trial and predator treatments were randomly allocated to tanks for each replicate.

A total of 2,220 minutes were recorded for the light phase and 3,320 minutes for the dark phase comprising 550 minutes observation for each predator treatment in the light phase and 830 minutes for each treatment in the dark phase. In all treatments combined, 10 of the 48 crayfish moved from the sedge refuge a total of 15 times in the light phase (control = 2, perch = 0, gudgeon = 6, water scorpion = 7) and 28 of the 48 crayfish moved from sedge 73 times in the dark phase (control = 21, perch = 22, gudgeon = 16, water scorpion = 14). Crayfish spent 15.7 minutes away from the refuge in the light phase and 111.4 minutes in the dark phase. Overall *T. glypticus* only spent 2.3% of the total time out of the refuge.

Two-way anovas (predator treatment × light phase) were used to examine the proportion of time spent out of the refuge, and the number of times *T. glypticus* moved from the refuge (expressed as number of times per hour of observation). *T. glypticus* made significantly more moves out of the refuge in the dark phase compared to the light phase ($F_{1,88} = 9.94$, $p = 0.002$), but there was no difference detected between treatments ($F_{3,88} = 0.02$, $p = 0.995$). A higher proportion of time was also spent out of the refuge in the dark phase compared with the light phase ($F_{1,88} = 12.00$, $p = 0.001$) but there was no difference between the predator treatments ($F_{3,88} = 0.11$, $p = 0.954$). Crayfish spent from 14 to 937 seconds away from the refuge in the dark phase and from 21 to 166 seconds away from refuge in the light phase. There was no difference in the average duration of visits to the open area of the tank between predator treatments for either the light phase ($F_{2,7} = 0.96$, $p=0.430$) or the dark phase ($F_{3,24} = 0.18$, $p=0.908$).

These laboratory observations match field observations in terms of this species association with sedges, with individuals only spending a small proportion of their time away from the sedge refuge. Observations also suggest that *T. glypticus* is more active nocturnally. However, even though activity increased in the dark period, crayfish spent only a small proportion of time away from the refuge. Both nocturnal activity and the use of refuge are common behaviours in crayfish and may reduce the risk of predation (Stein & Magnuson, 1976). However, these laboratory data provide no evidence that *T. glypticus* modify their behaviour in the presence of visual or chemical cues from predators. It is possible that *T. glypticus* spend the majority of time in sedges where all resources are available, and this association has little to do with predator avoidance. Alternatively, they do use open areas more frequently in the field, but their behaviour in the laboratory was extremely modified. The strong link between *T. glypticus* and sedges would need to be confirmed in the field with night time observations of their habitat use and behaviour.

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